Biofuel From Algae Market Potential

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Algae-based technologies could provide a key tool for reducing greenhouse gas emissions from coal-fired power plants and other carbon intensive industrial processes.

Driven by escalating global climate change concerns and the rising cost of petroleumbased energy, companies are now starting to examine using certain forms of algae to reduce carbon emissions from power plants, generate renewable transportation fuels, and produce feed for fish and livestock.

Using an intricate photosynthetic process, trendsetters have developed biodiesel and ethanol from an unlikely source – algae – that, given optimal conditions, can double its volume overnight. Up to 50 percent of an alga's body weight is comprised of oil, whereas oil-palm trees—currently the largest producer of oil to make biofuels—yield just about 20 percent of their weight in oil.

Soy produces some 50 gallons of oil per acre per year; canola, 150 gallons; and palm, 650 gallons. But algae are expected to produce 10,000 gallons per acre per year, and eventually even more.

Algae are the fastest-growing plants in the world. But if it were easy to extract the fuel, most of the world's biodiesel would already be made from microalgae grown on nonagricultural land, close to coal-fired power plants. It's critical to understand how to select the right algae species, create an optimal photobiological formula for each species, and build a cost-effective photobioreactor that can precisely deliver the formula to each individual algae cell, no matter the size of the facility, or its geographical location.

Algae are a large and diverse group of simple, typically autotrophic organisms, ranging from unicellular to multicellular forms. The largest and most complex marine forms are called seaweeds. They are photosynthetic, like plants, and 'simple' because they lack the many distinct organs found in land plants. Though the prokaryotic cyanobacteria (commonly referred to as blue-green algae) were traditionally included as 'algae' in older textbooks, many modern sources regard this as outdated and restrict the term algae to eukaryotic organisms. All true algae therefore have a nucleus enclosed within a membrane and chloroplasts bound in one or more membranes.

Algae constitute a paraphyletic and polyphyletic group, as they do not all descend from a common algal ancestor, although their chloroplasts seem to have a single origin.

Algae lack the various structures that characterize land plants, such as phyllids and rhizoids in nonvascular plants, or leaves, roots, and other organs that are found in tracheophytes. They are distinguished from protozoa in that they are photosynthetic. Many are photoautotrophic, although some groups contain members that are mixotrophic, deriving energy both from photosynthesis and uptake of organic carbon either by osmotrophy, myzotrophy, or phagotrophy. Some unicellular species rely entirely on external energy sources and have limited or no photosynthetic apparatus.

This report examines the potential of Algae to act as a viable fuel in the near future. Learn about the technology, new research, and what major players are doing to further this biofuels.

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